

Post-MAP migration of crosswell seismic data

wave with a center frequency 300 Hz. Fig. 2(a) is the result of applying the VSP-CDP mapping, stacking middepths from 1912.5 to 2150 ft. As shown in the figure, the three diffractions were not collapsed by VSP-CDP mapping. The mapped diffractions can be misinterpreted as dipping or discontinuous horizontal reflectors. Fig. 2(c) shows the post-stack migrated section corresponding to the VSP-CDP mapped section in Fig. 2(a). After migration, dip filtering was used to reduce edge effects from the short aperture of the parabola curve. The velocity for migration was calculated with Eq. (17) using a middepth of 2150 ft. As shown in the figure, the curve for a diffractor at the center was collapsed perfectly. Curves for the other diffractors are collapsed even though there is some mispositioning and residual tails. These effects come from the assumption of a midpoint diffractor.

The second model consisted of many horizontal reflectors. This model was used to verify the fact that post-stack migration doesn't distort the VSP-CDP mapping for horizontal reflectors. The distance between the source well and receiver well was 586 ft. Sources and receivers were located from 2400 to 3000 ft and both source and receiver intervals were 5 ft (Fig. 3(b)). The source was the zero phase Ricker wave with the center frequency 700 Hz. Fig. 3(a) shows the VSP-CDP mapped and stacked section for this velocity model. The mapped data were stacked using middepths from 2450 to 2900 ft. The post-MAP migrated section is shown in Fig. 3(d). M in Eq. (17) was assumed $0.83 z_d$ and the velocities used in the VSP-CDP mapping were used as v_{diff} . The image is a little bit distorted near the wells. Fig. 3(c) was created from three separate parts. The migrated section (Fig. 3(d)) was used *only* for the center part (100~486 ft from the source well). The VSP-CDP mapped section was used for the region near the wells (100 away from each well) where the migration assumptions break down. In this region, the Fresnel zone is

smaller (Lazaratos, 1993) and migration is less necessary. These boundaries are indicated as dotted lines in the figure. As shown in the figure, the application of the post-stack migration to the VSP-CDP mapped section doesn't distort the result for horizontal reflectors.

CONCLUSIONS

Crosswell diffractions are not collapsed by the VSP-CDP mapping. These diffractions can be misinterpreted as horizontal or dipping reflectors. We focused diffractions using conventional surface seismic post-stack migration with a modified velocity. In two model datasets, the results are superior to VSP-CDP stacking.

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